

CLAIMS

1. A transition metal complex with 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl as a ligand.

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2. The transition metal complex according to claim 1, wherein the transition metal is rhodium, ruthenium, iridium, palladium, nickel or copper.

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3. The transition metal complex according to claim 1, wherein the transition metal is rhodium, ruthenium, iridium, palladium or nickel.

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4. The transition metal complex according to claim 1, wherein the transition metal is rhodium.

5. The transition metal complex according to claim 1, wherein the transition metal is ruthenium.

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6. The transition metal complex according to claim 1, which is represented by $\text{Ru}(\text{L})(\text{AcO})_2$ wherein L denotes 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl and Ac denotes acetyl.

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7. The transition metal complex according to claim 1,

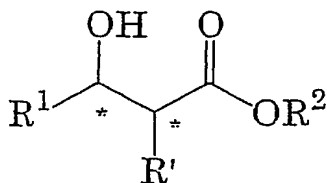
which is represented by $\text{Ru}(\text{L})\text{Cl}_2$ wherein L denotes 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl.

5 8. The transition metal complex according to claim 1, which is represented by $\text{Ru}(\text{L})\text{Cl}_2(\text{dmf})_n$ wherein L denotes 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl and dmf denotes N,N-dimethylformamide.

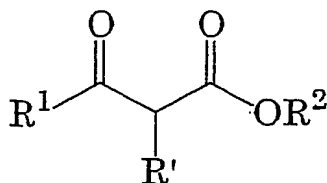
10 9. The transition metal complex according to claim 1, which is represented by $[\text{Rh}(\text{L})(\text{cod})]\text{OTf}$ wherein L denotes 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl, cod denotes 1,5-cyclooctadiene, and Tf denotes trifluoromethylsulfonyl.

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10. A process for preparing a compound represented by the formula:



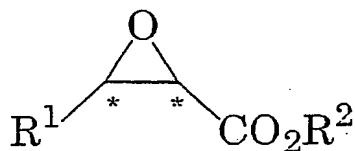
wherein * denotes the position of asymmetric carbon and the
 20 other symbols are as defined below, or a salt thereof,
 which comprises reducing a compound represented by the
 formula:



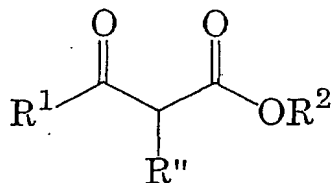
wherein R^1 denotes an optionally substituted hydrocarbon group or an optionally substituted heterocyclic group, R' denotes a halogen atom, optionally substituted
 5 alkylsulfonyl or optionally substituted arylsulfonyl, and R^2 denotes an optionally substituted hydrocarbon group, or a salt thereof in the presence of a transition metal complex with 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl as a ligand.

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11. A process for preparing a compound represented by the formula:

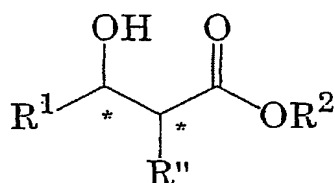


wherein respective symbols are as defined below, or a salt thereof, which comprises reducing a compound represented by
 15 the formula:



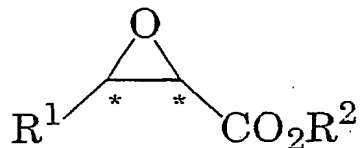
wherein R^1 denotes an optionally substituted hydrocarbon group or an optionally substituted heterocyclic group, R''

denotes a chlorine atom, a bromine atom, an iodine atom,
 optionally substituted alkylsulfonyloxy or optionally
 substituted arylsulfonyloxy, and R^2 denotes an optionally
 substituted hydrocarbon group, or a salt thereof in the
 presence of a transition metal complex in a solvent
 selected from an alcohol solvent, a hydrocarbon solvent, an
 ether solvent, an ester solvent, a ketone solvent, a
 nitrile solvent, a sulfoxide solvent and an amide solvent,
 or a mixed solvent of two or more kinds of them, to obtain
 a compound represented by the formula:



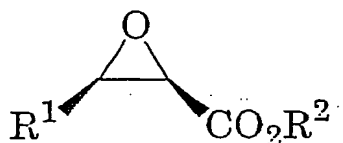
wherein * denotes the position of asymmetric carbon and the
 other symbols are as defined above, or a salt thereof, and
 then cyclizing the resulting compound in the presence of an
 inorganic base.

12. The process according to claim 11, wherein the
 compound represented by the formula:

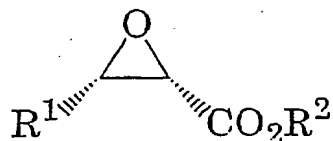


wherein R^1 denotes an optionally substituted hydrocarbon
 group or an optionally substituted heterocyclic group, R^2

denotes an optionally substituted hydrocarbon group, and * denotes the position of asymmetric carbon, is an optically active compound represented by the formula:

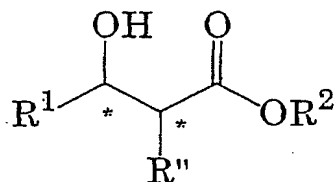


5 wherein respective symbols are as defined above, or the formula:



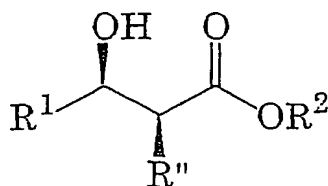
wherein respective symbols are as defined above.

10 13. The process according to claim 11, wherein the compound represented by the formula:

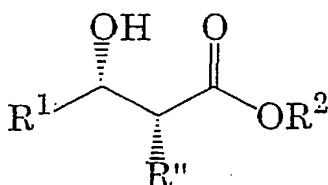


15 wherein R¹ denotes an optionally substituted hydrocarbon group or an optionally substituted heterocyclic group, R'' denotes a chlorine atom, a bromine atom, an iodine atom, optionally substituted alkylsulfonyloxy or optionally substituted arylsulfonyloxy, R² denotes an optionally substituted hydrocarbon group, and * denotes the position of asymmetric carbon, is an optically active compound

represented by the formula:



wherein respective symbols are as defined above, or the formula:



wherein respective symbols are as defined above.

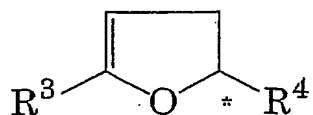
14. The process according to claim 11, wherein R'' is a chlorine atom, a bromine atom or an iodine atom.

15. The process according to claim 11, wherein the inorganic base is alkali metal carbonate.

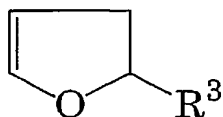
16. The process according to claim 11, wherein the solvent for reduction is an alcohol solvent.

17. The process according to claim 11, wherein the transition metal complex is a transition metal complex with 2,2'-bis[bis(3,5-di-tert-butyl-4-methoxyphenyl)phosphino]-1,1'-binaphthyl as a ligand.

18. A process for preparing a compound represented by the formula:



wherein * denotes the position of asymmetric carbon and the
 5 other symbols are as defined below, or a salt thereof,
 which comprises reacting a compound represented by the
 formula:



wherein R³ denotes a hydrogen atom or optionally
 10 substituted alkyl, or a salt thereof with a compound
 represented by the formula: R⁴-R''' wherein R⁴ denotes
 optionally substituted phenyl and R''' denotes a leaving
 group, or a salt thereof in the presence of a transition
 metal complex with 2,2'-bis[bis(3,5-di-tert-butyl-4-
 15 methoxyphenyl)phosphino]-1,1'-binaphthyl as a ligand.